Briefing #1 - Background and Overview of Task Relationships

Future Communications Study

Phase II End of Task Briefing

June 21, 2006

Background

- The Future Communications Study (FCS) is a bi-lateral, cooperative R&D effort between the FAA and Eurocontrol
- FCS goals and process are outlined in Action Plan 17
  - Include deriving operational concepts, communication requirements, and conducting technology evaluations to identify candidates for the Future Radio System (FRS)
- NASA is a significant contributor to the FCS with primary responsibility for technology evaluations
  - ITT is contracted to NASA to perform the FCS technology evaluations
  - Technology evaluations are a scheduled three year activity
    - Defined activities include technology screening and detailed evaluations
  - The goal of the technology evaluations is to identify candidate technologies that can meet the needs of aviation for air-ground communications in the 2015 to 2025 and beyond time frame

Goal: Identify technologies that meet aviation needs

History of the Project

- ITT conducted a technology screening May – December 2004
  - Recommended applicable satellite and terrestrial technologies (in VHF, L- and C-Band)
- Briefings to industry and stakeholders resulted in feedback to study team requesting mid-course correction
  - Feedback is reflected in the emerging FAA data communications roadmap
- NASA, FAA and ITT deliberations (June 2005) resulted in the ITT direction for the current work efforts of the technology investigation
  - Defined activities included an additional technology screening and detailed evaluation of selected technologies that scored well in the first technology screening

Background – Results of Initial Technology Screening

- ITT recommendations from the initial technology screening were presented as “technologies of interest” for selected aeronautical frequency bands
  - Recommendations for the VHF Band
    - *VDL 3 is the only candidate that should be considered for this band* [recall that evaluation was for a voice **and** data system]
  - Recommendations for the DME Band
    - *B-VHF and P34 are the primary technology solutions recommended for the DME band*
    - *WCDMA is a secondary solution recommended for the DME band*
    - *VDL 3 is recommended for the DME band only with a modified physical layer to provide more data capacity* [this solution is known as LDL]
  - Recommendations for the MLS Band
    - *IEEE 802.16 is recommended for application in the MLS band*
  - Recommendations for AMS(R)S (Satellite) Spectrum
    - *Aero-BGAN, Iridium and SDLS can provide coverage in remote regions*
    - *Ability of these solutions to meet en-route availability requirements is questionable*

Background – Stakeholder Inputs

- The study team has received significant feedback from the stakeholders
  - Air Traffic Management Advisory Committee (ATMAC)
    - Sustain voice in VHF as long as possible
    - Pursue new technological solutions as a last resort
    - Data link is important – commit to a technology and implement by 2015
    - Keep AOC and ATS separate
  - ICAO
    - Focus on solutions for data only – voice is not the issue
    - Ensure traceability of evaluation criteria to consensus documentation
  - FAA senior management
    - FAA is not interested in building another terrestrial infrastructure
    - Concerned about the **cost** and **compatibility** issues of L-Band system
    - No money for an L-Band system, unless there is a new way to pay for the system
  - Eurocontrol
    - **Availability** of satellites preclude their use as a main system
    - European focus is an L-Band system

Background – The FAA Roadmap

- Based in part on feedback received from ATMAC, the FAA has put together a communications roadmap
  - This roadmap lays out a plan of action for the expected use of the VHF band, L-Band, C-Band and the role of satellites
    - VHF Band
      - Analog voice will be provided using 25 kHz, and if necessary, 8.33 kHz spacing
      - Air traffic management data link will be implemented using VDL-M2
      - VDL enhancements will be introduced to form a digital airborne data network
      - Networked ATC voice may be implemented in the future en route airspace to support emerging concepts
    - The time phasing of these actions, and the COCR capabilities that can be met and when, were determined to be the auspice of an FAA program as opposed to the FCS
      - No further study of the VHF band will be conducted by the technology assessment group

Background – The FAA Roadmap (2)

- Further details of the roadmap
  - L-Band
    - The FAA intends to use Mode-S Extended Squitter and UAT for surveillance and ADS-B functions
      - ADS-B functions are allocated to Mode-S and UAT, and the technology screening need not consider the functional and performance requirements of ADS-B
    - FAA will also engage in joint R&D efforts with Eurocontrol to study terrestrial based L-Band digital links
      - This joint R&D effort will lead to a harmonized L-Band digital link design that will be carried through the international standardization process
    - The FAA has no intention of fielding the L-Band data link at this time
      - However, the FAA will deploy the jointly developed L-Band digital link if the required data capacity can not be supported in the VHF band in the U.S.

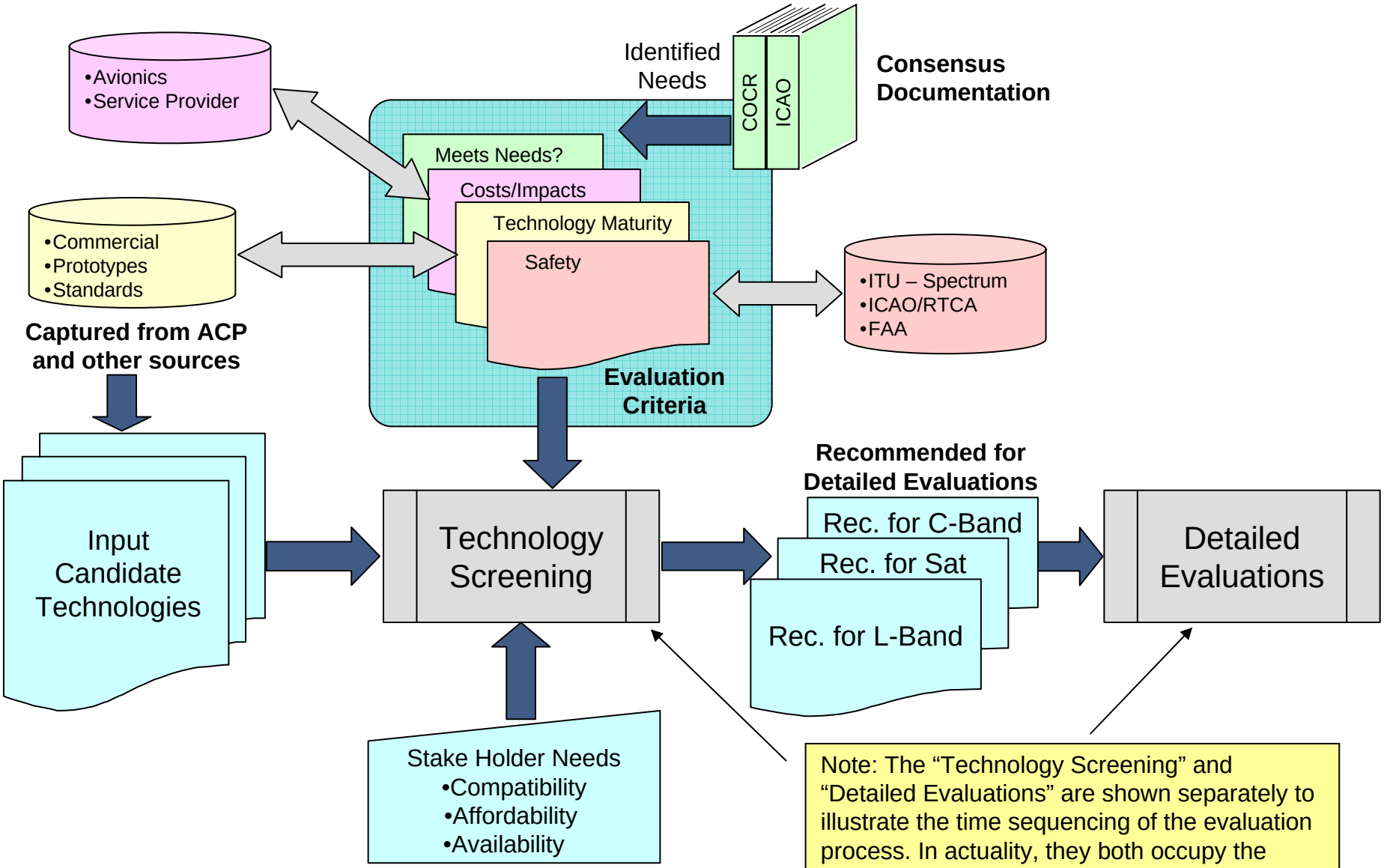
Background – The FAA Roadmap (3)

- Further details of the roadmap
  - Satellite and other commercial services
    - Current offerings (Inmarsat through ARINC and SITA) are expected to continue to provide ATM communications in Oceanic airspace
    - Future offerings (Iridium) may emerge to provide ATM communications in Oceanic airspace as these systems are certified
    - Other commercial services (Connexion, XM Radio) may emerge to provide AOC capabilities not currently offered
    - These offerings, as well as commercial terrestrial-based services, may provide advisory and non-safety information using SWIM capabilities
    - If these commercial providers can be certified to provide safety services, then they may eventually provide services in the en route environment
  - C-Band
    - The FAA roadmap makes no specific mention of C-Band
    - The FAA spectrum management organization is investigating the use of C-Band to provide LAN services, perhaps using modified COTS technologies to meet the needs of its (FAA Spectrum) customers

Background – NASA, FAA and ITT Coordination Meeting Decisions

- NASA and the FAA jointly defined the following ITT activities for the second phase of the technology investigation
  - **Evaluation Criteria Development and technology screening**
    - Conduct structured analysis of COCR and develop traceable evaluation criteria – enhance requirements as required (especially data rate)
    - Conduct a second technology screening
  - **Detailed Evaluation of Technologies**
    - Several technologies that scored well in the first technology screening were selected for detailed evaluation. These included P34, LDL, INMARSAT, Iridium and 802.16e
      - The evaluation of P34 and LDL required characterization of L-Band, including
        - » Characterizing the propagation characteristics of the band
        - » Studying the electro-magnetic compatibility issues associated with the band
        - » Developing a business case for a commercial service provider
      - Evaluation of INMARSAT and Iridium focused on their ability to meet the required availability for operational services that is specified in the COCR
      - Evaluation of 802.16e was aligned with its suggested function (airport surface communications using the extended MLS band)

Elements of the Candidate Technology Evaluation



Structure and Content of the Presentations